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**SEMINAR SERIES ON CHAOS, CONTROL AND COMPLEX NETWORKS**

**Global Stability, Chaos Control and Synchronization  
of Dynamic Systems, and Chaotic Systems with Time Delays**

**Dr. Fei XU**

Department of Physics  
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Date and Time: Friday, 5 December 2008, 4:30pm – 5:30pm

Venue: Room B6605, City University of Hong Kong

Reception starts at 4:15pm

(Language: **English**)

**Abstract**

The study of nonlinear science has evolved into a new era, with fundamental theories established and important results obtained in the areas of chaotic dynamics such as chaos control, chaos synchronization, ultimate boundedness of chaotic attractors, and nonlinear dynamic systems with time delay. This talk is dedicated to the study of chaos, and mainly focused on global stability, ultimate boundedness, chaos control and synchronization, and chaotic systems with time delay. Firstly, a series of simple feedback controls is proposed to obtain global stabilization and global synchronization for  $n$ -scroll chaotic attractors in a modified Chua's Circuit. Secondly, we show that the chaotic attractor in the modified Chua's circuit is globally attractive, and provide detailed estimations for the globally attractive set and positive invariant set. Finally, a discovery of a general phenomenon existing in chaotic systems is reported: a simple time delay, directly applied to one or more state variables, transforms the Lorenz system to the generalized Chen system or the generalized Lü system without any parameter changes. Similar phenomenon in other chaotic systems has also been confirmed.

**About the Speaker**

Dr. Fei Xu received his BSc and MSc degrees in Electrical and Computer Engineering from Jilin University, China in 1998 and 2001, respectively. He received his Ph.D. degree in Applied Mathematics from the University of Western Ontario, Canada in 2008. Dr. Fei Xu is currently a postdoctoral fellow in the Department of Physics at the Hong Kong Baptist University. His research interests include nonlinear dynamic system and its applications, secure communication, complex networks, heat conduction, and signal processing.